

Code No: R31036

III B.Tech. I Semester Regular and Supplementary Examinations, December -2013

METAL CUTTING & MACHINE TOOLS

(Mechanical Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. a) What are the main applications of cutting fluids?
b) Show schematically the Merchant's force circle. Derive the expression for shear force in terms of the material properties and cutting process parameters.
2. a) What type of work holding devices are generally used in a lathe? Give the typical applications and disadvantages of such devices.
b) Briefly explain with the neat sketches, the types of work holding devices that are commonly employed in automatic lathes.
3. a) Describe the operation of a quick return motion mechanism in a mechanical shaper.
b) Describe the important work holding devices used in a planning machine.
4. a) Show with neat sketches the constructional features of a twist drill and label the important features.
b) Describe the kinds of operations that can be performed on a drill press.
5. a) With the help of neat sketches, explain the following with reference to milling:
(i) Straddle milling
(ii) Gang milling
c) Describe the various methods of supporting an arbour in a milling machine spindle.
6. a) Describe briefly about tool and cutter grinder.
b) Write the advantages and limitations of centre-less grinding machine.
7. a) What are the principles to be considered while placing the locators in different planes of a part? Explain briefly.
b) Explain the three types of locators used in jigs and fixtures.
8. a) Explain the important constructional features of CNC machines.
b) List out the applications of CNC machines.



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1. a) Draw the neat sketch of single point cutting tool geometry and explain the different angles on the single point cutting tool.
b) Name the different types of chips and explain them briefly.
2. a) What are the various methods available for taper turning on lathe? Explain them briefly.
b) What are the various types of automatic lathes in the multi-spindle category? Explain their differences and applications.
3. a) Sketch and describe the tool head of a shaper.
b) Enumerate the differences between shaper, slotting and planner.
4. a) Explain briefly the construction of a drill press with emphasis on how the requisite motions are obtained.
b) Explain why the drilling operation is not an accurate hole making process.
5. a) Give a brief classification of various milling machines used in the industry, giving a brief note on the applications.
b) Explain the various methods of indexing.
6. a) Describe the dressing and balancing requirement in grinding.
b) Write short notes on the following:
 - (i) Lapping process
 - (ii) Honing process
7. a) Describe any two locators used in jigs.
b) What are the different types of jig bushes used? Explain them briefly.
8. a) What are the different motion control systems? Explain them briefly.
b) Explain the advantages and limitations of using CNC machines over conventional machines.



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1. a) What are the desirable characteristics of a cutting tool material?
b) What is meant by built up edge? With a neat sketch, explain the formation of a built up edge.
2. a) Describe the method of generation of a long and small taper in a centre lathe.
b) What are the different types of automatic lathes? Explain the applications and limitations of each of the types.
3. a) Sketch and explain the principle parts and working of a slotting machine.
b) Explain with a neat sketch the quick return mechanism in a shaper.
4. a) Define and explain the importance of the following in drilling:
(i) Lip angle
(ii) Helix angle
(iii) Rake angle
c) Show with neat sketches the constructional features of jig boring machine and explain the important features.
5. a) What are the various types of end mills used in milling? Draw the simple sketches and explain briefly.
b) Explain the functions of a universal dividing head.
6. a) Describe the features of a broach and explain their functions.
b) Describe in detail the various arrangements of centre-less grinding with neat sketches.
7. a) What are the different types of clamps used in jigs and fixtures? Explain them briefly.
b) Explain the functions served by a fixture.
8. a) Explain the advantages and limitations of numerical control of machine tools.
b) Explain the different types of motion controls used in CNC machines.



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R10

Set No: 4

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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
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1. a) Describe the types of machining operations that can be performed on a lathe.
b) Define tool life and explain the parameters that control the tool life of a single point cutting tools.
2. a) Write the application and disadvantage of the following type of work holding devices.
 - (i) 3 jaw chuck
 - (ii) 4 jaw chuck
 - (iii) Face platec) What is tool layout? Explain its importance in automats with a suitable example.
3. a) Explain with a neat sketch the operation and need for a clapper box in a mechanical shaper.
b) Describe the operation of cutting T-slots on a planner.
4. a) Explain briefly the deep hole drilling operation.
b) What are the different types of tool holding devices used on drilling machine? Explain them briefly.
5. a) Explain the various work holding devices used in milling.
b) What are the differences between compound indexing and differential indexing?
c) Describe the relative characteristics of climb milling and up milling.
6. a) Explain why broaching is a commonly used process. Give some typical applications.
b) Explain the various types of bonds used in the making of the grinding wheels. Mention their applications.
7. a) Write the applications of plate jigs.
b) What is meant by 3-2-1 principle of location?
c) Give the important points to be kept in mind to decide the clamping system in jigs and fixtures.
8. a) Briefly explain the principle of Computer Numerical Control for machine tools.
b) Describe the four main features of CNC machines, which distinguish them from conventional machine tools
